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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/641,379   | 08/14/2003  | Yunbiao Shen         | D5437               | 1247             |
| 30409  | 7590        | 08/02/2005           | EXAMINER            |                  |
| INTERNATIONAL ENGINE INTELLECTUAL PROPERTY COMPANY<br>4201 WINFIELD ROAD<br>P.O. BOX 1488<br>WARRENVILLE, IL 60555 |             |                      | MC CALL, ERIC SCOTT |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2855                |                  |

DATE MAILED: 08/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |               |
|------------------------------|-----------------|---------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s)  |
|                              | 10/641,379      | SHEN, YUNBIAO |
|                              | Examiner        | Art Unit      |
|                              | Eric S. McCall  | 2855          |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on 20 May 2005.
- 2a) This action is **FINAL**.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-20 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-11,13,14 and 16-20 is/are rejected.
- 7) Claim(s) 12 and 15 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 12 June 2004 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    - 1) Certified copies of the priority documents have been received.
    - 2) Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3) Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

|   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____.   |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____.  | 6) <input type="checkbox"/> Other: _____.                                   |

**APPARATUS AND METHOD FOR EVALUATING**  
**FUEL INJECTORS**

**FINAL OFFICE ACTION**

In response to the Applicant's amendment dated May 20, 2005.

**DRAWINGS**

In response to the Applicant's amendment, the objection to the drawings as set forth in the previous office action (Feb. 23, 2005) has been overcome.

**CLAIMS**

**35 U.S.C. § 112**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

As set forth in the previous office action (Feb. 23, 2005), claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention because claim 3 sets forth that “the chamber is a combustion chamber”. However, the Applicant’s disclosure (paragraph 16) sets forth that the chamber only “simulates” a combustion chamber. Thus, a contradiction exists.

In response, the Applicant has pointed to paragraph 25 of the present application for support of the subject matter of claim 3. However, after reviewing paragraph 25, the Examiner has found no support to the limitation of “the nozzle of the fuel injector being mounted to and protruding into a combustion chamber”. Thus, the rejection still stands.

35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

As set forth in the previous office action, claims 1-4, 7, 8, 10, 11, 14, 16, and 18 are rejected under 35 U.S.C. 102(a) as being anticipated by Wlodarczyk et al. (6,622,549).

With regards to claim 1, Wlodarczyk et al. teach an apparatus (Fig. 1) comprising:  
a fuel injector inherently operably connected to a fluid supply system and having a nozzle (10) with a fluid cavity (18);  
at least one discharge port (bottom of fuel injector in Fig. 1) disposed in the nozzle (10);  
an orifice (16) disposed in the nozzle; and  
a pressure sensor (12) adjacent to the orifice, wherein fluid in the fluid cavity (18) is in fluid communication with the pressure sensor, such that the pressure sensor measures fluid pressure (col. 3, lines 36-40).

With regard to claims 2-4, the nozzle of the prior art inherently is mounted to and protrudes into a chamber for the receiving of fluid from the discharge port as claimed because the nozzle of the prior art's fuel injector inherently protrudes into a combustion chamber (thus the reasoning for the combustion pressure sensor, 14) wherein the combustion chamber receives fluid discharged from the fuel injector via the discharge port.

With regards to claim 7, the prior art inherently teaches the fluid supply system comprising a fluid tank and a fuel pump because the prior art teaching centers around a fuel injection system for an internal combustion engine, and fuel injected internal combustion engines inherently have a fuel tank and a fuel pump for supplying fuel to the fuel injected system.

With regards to claim 8, the pressure sensor of the prior art has attached thereto a monitoring device as claimed (col. 3, lines 48-55).

With regards to claim 10, Wlodarczyk et al. teach a fuel injector (Fig. 1) comprising:  
a nozzle (10) having at least one discharge port (bottom of fuel injector in Fig. 1);  
a needle (20) slideably mounted inside the fuel injector and the nozzle;  
a fluid cavity (18) disposed in the nozzle (10); and  
a pressure sensor (12) arranged to measure pressure in the fluid cavity (col. 3, lines 36-40).

With regards to claim 11, the prior art discloses an orifice (16) disposed along an outer boundary of the fluid cavity (18) and disposed in the nozzle (10), wherein the pressure sensor (12) is disposed in the orifice (Fig. 1).

With regards to claim 14, Wlodarczyk et al. teach a method comprising the steps of:  
charging a fuel injector with fluid (ie. fuel flowing into the fuel injector);  
discharging the fluid from at least one discharge port (bottom of Fig. 1) in a nozzle (10) of the fuel injector;  
communicating fluid to a pressure sensor (12) through a first orifice (16) disposed in the nozzle (10); and  
measuring fluid pressure near the at least one discharge port with the pressure sensor.

With regard to claims 16 and 18, the prior art suggests the claimed subject matter thereof because the fuel discharged from the fuel injector is contained to the combustion chamber.

35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

As set forth in the previous office action, claims 9, 13, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wlodarczyk et al. (6,622,549).

With regard to claims 9, 13, and 20, Wlodarczyk et al. teach a pressure sensor (12) but fail to specifically teach the material from which the pressure sensor is made and thus fail to teach the pressure sensor being a piezoelectric quartz transducer as claimed.

Nonetheless, it would have been obvious to one having ordinary skill in the art armed with said teaching to use a piezoelectric quartz transducer pressure sensor as the pressure sensor in the Wlodarczyk et al. teaching.

The motivation being that a piezoelectric quartz transducer is a well known and commonly used type of pressure sensor and because of it's reliability and durability would be appropriate for being used in the environment as set forth by the Applicant.

With regards to claim 17, Wlodarczyk et al. fail to teach controlling the operating pressure of the chamber as claimed.

However, it would have been obvious to one having ordinary skill in the art armed with said teaching to control the chamber operating pressure as claimed.

The motivation being that the chamber as claimed reads on an engine combustion chamber of the type disclosed by Wlodarczyk et al. and one having ordinary skill in the art would have reason to control the operating pressure in an engine combustion chamber because if combustion chamber pressure was not maintained improper engine operation would result.

As set forth in the previous office action, claims 5, 6, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wlodarczyk et al. (6,622,549) in view of Bunch, Jr. et al. (5,000,043).

With regards to claim 5, Wlodarczyk et al. fail to teach a pressure control valve as claimed.

However, Bunch, Jr. et al. do teach such a pressure control valve (30).

As a result, it would have been obvious to one having ordinary skill in the art armed with said teachings to include the pressure control valve as taught by Bunch, Jr. et al. with the teachings of Wlodarczyk et al.

The motivation being in order to control the pressure of the chamber for the proper testing of the fuel injector.

With regard to claims 6 and 19, Wlodarczyk et al. fail to teach a flow-metering unit as claimed, but Bunch, Jr. et al. do teach such a flow-metering unit. Thus, it would have been obvious to one having ordinary skill in the art armed with said teachings to include the flow-metering unit as taught by Bunch, Jr. et al. with the teachings of Wlodarczyk et al.

The motivation being in order to control the pressure and flow of the chamber for the proper testing of the fuel injector.

Allowable Subject Matter

Claims 12 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the prior art fails to teach or suggest an orifice in the needle as claimed in combination with the remaining limitations of each respective claim.

**Response to Arguments**

With respect to the Applicant's arguments pertaining to claim 1, the Applicant has argued that Wlodarczyk et al. do not teach an orifice disposed in the nozzle of the fuel injector because the channel 16 (which is the orifice as relied upon by the Examiner) of the Wlodarczyk et al. teaching is not in the nozzle of the injector. The Applicant supports their argument by stating that it is well known in the art that the "nozzle" is only the area at the bottom of the injector.

The Examiner disagrees. First because the Applicant has provided no evidence to support their position that the nozzle is only the area at the bottom of the injector, and second, because fuel injector nozzles are known to include more than just the very tip of a fuel injector as can be seen by the cross-hatching in Fig. 1 of the Wlodarczyk et al. teaching. The very same cross-hatching used in the bottom most portion of the fuel injector in Fig. 1 extends up to and includes the area which houses the "orifice" (16). Therefore, this entire area has been interpreted as a "nozzle" as claimed by the Applicant.

Furthermore, the Examiner points out that nothing in the Applicant's claim 1 defines a nozzle in a way in which the Applicant is now arguing.

With regards to claim 10, the Applicant has argued that Wlodarczyk et al. fail to disclose "a fluid cavity disposed in the nozzle and a pressure sensor arranged to measure pressure in a fluid cavity". However, the Examiner points out that the cavity (18) of Wlodarczyk et al. is clearly disposed within the nozzle of the fuel injector.

Likewise with claim 14, the very same analysis used above pertaining to the orifice in the nozzle applies.

Next, the Applicant has argued that the pressure sensor of Wlodarczyk et al. is not in the nozzle of the injector and that one of ordinary skill in the art would appreciate that measuring fluid pressure with a sensor disposed in the nozzle of a fuel injector will yield advantageous results over the system of Wlodarczyk.

However, the Examiner points out that none of the independent claims 1, 10, or 14 to which the above argument is addressed requires the pressure sensor, itself, to be disposed within the fuel injector nozzle. Thus, a contradiction exists between the Applicant's invention as claimed and the benefits of the Applicant's invention as now argued.

With respect to the Applicant's arguments pertaining to the rejection of claims 9, 13, and 17 under 35 USC 103(a), the Applicant has argued the use of piezoelectric quartz transducers in place of the optical fiber sensors as taught by Wlodarczyk et al. because Wlodarczyk et al. do not teach such a replacement. The Examiner responds by stating that if Wlodarczyk et al. did make such a teaching the rejection would have been applied under 35 USC 102 and not 35 USC 103. The Examiner points out that it is improper to argue a rejection applied under 35 USC 103 as if it was applied under 35 USC 102.

Finally, with respect to the Applicant's arguments pertaining to the rejection of claims 5, 6, and 19 under 35 USC 103(a), the Applicant has not provided any specific arguments other than to state that the teaching of Bunch fails to teach an orifice disposed in the nozzle. However, the Examiner points out that the teaching of Bunch was not relied upon for the teaching of such an orifice since Wlodarczyk et al. provided such a teaching. The Applicant has provided no other specific arguments pertaining to the said rejection.

**CONCLUSION**

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric S. McCall whose telephone number is (571) 272-2183.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Eric S. McCall  
Primary Examiner  
Art Unit 2855  
July 28, 2005